# HUNTER T Mk 8B



## 1 General

The Hunter T Mk 8B is basically a T Mk 8C aircraft fitted with an Integrated Flight Instrument System (IFIS). The differences between the Hunter T Mk 8B and the T Mk 8C are covered in this Annexe. Reference should be made to the main part of the Notes for all other systems, and to Part 6 Fig 2 for the cockpit illustration.

## 2 DC Supplies

*(a)* Two 24 volt batteries (connected in parallel) in the radio bay provide the DC supplies when the generators are not charging.

*(b)* Two 12 volt batteries (connected in series) in the radio bay provide standby supplies for the standby artificial horizon and direction indicator and the cockpit emergency lighting.

*(c)* A 24 volt battery in the radio bay provides a standby supply for the standby UHF set.

## 3 AC Supplies

*(a)* The 115 volt, 3-phase, 400 Hz AC supplies are provided by two type 103 inverters (No 1 and No 2) and one type 100A inverter (No 3). The No 3 inverter is normally off but can act as a limited standby for either No 1 or No 2 inverter. For both type 103 inverters to run, both generators must be on line. The three inverters cannot run simultaneously.

*(b)* The No 1 inverter supplies the master reference gyro (MRG), the air data system, the starboard (instructor's) artificial horizon and the essential services (standby artificial horizon and direction indicator, Mk 30B altimeter, IFIS lighting, oil pressure gauge, engine top temperature control and cockpit pressurisation control). The No 2 inverter supplies Tacan and also acts as a standby for the No 1 inverter.

*(c)* When the engine master switch is selected on, the No 3 inverter starts and supplies the essential services. When a generator comes on line after the engine is started, the No 2 inverter starts and the No 3 inverter shuts down; after a 5 second delay, the No 1 inverter starts and the No 2 inverter shuts down. The No 2 inverter does not start again until the landing gear is selected up after take-off.

*(d)* A latched relay maintains the No 2 inverter when the landing gear is selected down; the inverter shuts down when the weight of the aircraft is on the main wheels

## Table 1 — Summary of Normal Inverter Switching and Indications

| *Condition* | *Switching and Indications* | *Supplies* |
|---|---|---|
| Engine master switch on | No 1 off, indicates STBY<br>No 2 off, indicates STBY<br>No 3 starts | Essential services |
| Engine started | No 2 starts, indicates MAIN<br>No 3 shuts down<br>No 1 off, indicates OFF | |
| | *After 5 seconds*:<br>No 1 starts, indicates MAIN<br>No 2 shuts down, indicates OFF | All services except Tacan |
| Changeover check | Select No 2<br>No 2 starts, indicates MAIN<br>No 1 shuts down, indicates OFF | All services except Tacan |
| | Reselect No 1. *After 5 second delay,*<br>No 1 starts, indicates MAIN<br>No 2 shuts down, indicates OFF | All services except Tacan |
| Tacan check | Select No 3 to STBY<br>No 1 on, indicates MAIN<br>No 2 off, indicates STBY | MRG<br>Remaining services plus Tacan |
| Tacan check completed | Select changeover switch to No 2 and then reselect No 1<br>No 1 on, indicates MAIN<br>No 2 off, indicates OFF<br>No 3 off | All services except Tacan |
| Landing gear up | No 1 on, indicates MAIN<br>No 2 starts, indicates MAIN | All services except Tacan<br>Tacan |
| After landing | No 1 on, indicates MAIN<br>No 2 shuts down, indicates OFF | All services except Tacan<br>(If No 1 has previously failed, No 2 continues to run) |

Note: The essential services are: Standby AH and DI
Mk 30B altimeter
IFIS lighting
Engine oil pressure gauge
Engine top temperature control
Cockpit pressurisation control

## Table 2 — Summary of Inverter Switching and Indications following Malfunction

| *Condition* | *Switching and Indications* | *Supplies* |
|---|---|---|
| No 1 failed | No 1 off, indicates OFF<br>No 2 on, indicates MAIN<br>Attempt to restart No 1 by selecting No 2 momentarily | Tacan off-loaded<br>All services except Tacan |
| | *If successful*<br>No 1 on, indicates MAIN<br>No 2 on, indicates MAIN | <br>All services except Tacan<br>Tacan |
| | *If unsuccessful*<br>No 1 off, indicates OFF<br>No 2 on, indicates MAIN<br>Select No 2 to off-load DC | <br>Tacan remains off-loaded<br>All services except Tacan |
| If Tacan required | Select No 3 to STBY<br>No 1 off, indicates STBY<br>No 2 on, indicates MAIN | MRG<br><br>All remaining services plus Tacan |
| No 2 failed | No 2 off, indicates OFF<br>No 1 on, indicates MAIN | Tacan off-loaded<br>All services except Tacan |
| If Tacan required | Select No 3 to STBY<br>No 1 on, indicates MAIN<br>No 2 off, indicates STBY | MRG<br>All remaining services plus Tacan |
| No 1 and No 2 failed | No 3 starts automatically<br>No 1 off, indicates STBY<br>No 2 off, indicates STBY | Essential services only. Starboard AH continues to operate |
| Triple failure | No 1 off, indicates OFF<br>No 2 off, indicates OFF<br>No 3 off | Standby AH and DI and starboard AH continue to operate |

Note 1: The starboard (instructor's) artificial horizon is supplied by a static inverter if No 1 and No 2 inverters fail; the changeover is automatic.

Note 2: The standby AH and DI are supplied by a static inverter if all three inverters fail; the changeover is automatic.

Note 3: IFF/SSR is supplied by a type E182 static inverter.

unless the No 1 inverter has previously failed. If the landing gear is left down following a roller landing, the No 2 inverter can be regained for Tacan operation by selecting the inverter changeover switch (para 5 (*c*)) to No 2 inverter momentarily and then reselecting No 1 inverter.

(*e*) A static inverter (supplied from the main DC busbar) in the control unit type B provides AC power for the standby artificial horizon and direction indicator in the event of a triple inverter failure. The changeover is automatic.

(*f*) A static inverter in the control unit type D (supplied from the main DC busbar) provides AC power for the starboard (instructor's) artificial horizon in the event of a double inverter failure (No 1 and No 2). The changeover is automatic.

(*g*) A type E 182 static inverter provides AC power for the IFF/SSR; control is by the IFF/SSR master switch.

## 4 Standby Battery Controls

(*a*) The static inverter of the standby artificial horizon and direction indicator is automatically connected to the standby batteries if the main battery voltage falls below that of the standby batteries. A pitot-operated switch opens below 75 knots to prevent draining of the standby batteries on the ground. The pitot switch can be overridden to close by the DI AH switch adjacent to the instruments. If both generators fail, in case the pitot switch has failed to close, the DI AH switch should be set to EMERGY to ensure that the static inverter is automatically connected to the standby batteries when the battery voltage falls.

(*b*) The UHF standby battery is connected to the standby UHF when the NORMAL/EMERGENCY switch is selected to EMERGENCY.

## 5 AC Supplies, Controls and Indicators

(*a*) Switching on the engine master switch starts the No 3 inverter. The No 1 and No 2 inverters are started and

controlled in an automatic sequence when a generator is brought on line.

(*b*) (i) Two indicators on the centre pedestal, one for No 1 inverter and the other for No 2 inverter, give indication of which inverters are in use.

(ii) When an indicator shows MAIN, the associated type 103 inverter is running. When OFF is shown, the associated type 103 inverter is shut down. If an indicator shows STBY, the standby type 100A inverter (No 3) is running and the associated type 103 inverter is shut down.

(*c*) A 2-position CHANGEOVER — No 1 (up) / No 2 (down) switch on the centre pedestal can be used to switch the No 2 output to take over the No 1 inverter loads if it is suspected that the No 1 inverter is malfunctioning and an automatic changeover has not taken place. When No 2 inverter is selected, the No 1 inverter does not shut down until the No 2 inverter takes over the loads. Following a transient failure of No 1 inverter, selecting the changeover switch to No 2 and then reselecting No 1 should restart the No 1 inverter after a 5 second delay. If the No 1 inverter does not restart, reselect No 2 to off-load the DC supplies to the No 1 inverter.

(*d*) A STBY switch to the right of the changeover switch can be used to start the No 3 inverter provided that either No 1 or No 2 inverter is not running. The switch is spring-loaded to off.

## 6 Pre-Flight Procedures

(*a*) Switch on the battery master switch and check the functioning of all DC operated instruments and indicators.

(*b*) Switch on the engine master switch, and check that the No 3 inverter is operating by observing that both inverter indicators change from OFF to STBY.

(*c*) Start the engine. Check that the generator warning lights go out and, simultaneously, that the No 2 inverter starts up, that its indicator shows MAIN and that No 1 inverter indicator shows OFF (indicating that the No 3 inverter has shut down). After 5 seconds, check that the No 1 inverter starts up, that its indicator shows MAIN and that the No 2 inverter indicator changes to OFF.

(*d*) Check the functioning of the changeover facility by setting the changeover switch to No 2 inverter. Check that the No 1 inverter indicator changes to OFF and the No 2 inverter indicator to MAIN. Reselect the changeover switch to No 1 inverter and check that, after a delay of 5 seconds, the No 1 inverter indicator shows MAIN and the No 2 inverter indicator shows OFF.

(*e*) Note that, after the engine has been started, Tacan can only be tested by starting the No 3 inverter, since only one type 103 inverter is running at this stage. The No 3 inverter should not be started until the IFIS display failure flags have cleared. After completing the Tacan check, the No 3 inverter should be shut down by selecting the changeover switch to No 2 and then reselecting No 1.

## 7 Malfunctioning of the System

(*a*) *Single Inverter Failure* (*No* 1 *or No* 2)

(i) If No 1 inverter fails, No 2 inverter automatically off-loads Tacan and takes over the No 1 inverter load.

(ii) If No 2 inverter fails, Tacan is off-loaded.

(iii) In both of the above cases, Tacan can be regained by selecting the No 3 inverter switch to STBY. When the No 3 inverter is running it takes over the MRG load and reconnects the Tacan load to the serviceable type 103 inverter. If the unserviceable type 103 inverter is subsequently restarted, ie by use of the changeover switch or if the malfunction automatically clears, the No 3 inverter shuts down and the system reverts to normal since it is not possible for all three inverters to be running simultaneously.

(*b*) *Double Inverter Failure* (*No* 1 *and No* 2)

If both No 1 and No 2 inverters fail, No 3 inverter starts automatically to supply the essential services (the standby artificial horizon and direction indicator, the Mk 30B altimeter, the oil pressure gauge, the top temperature control, the cockpit pressurisation control and the IFIS lighting). All other services operated by No 1 and No 2 inverters are lost. The starboard (instructor's) artificial horizon continues to operate using AC from the static inverter in its control unit. The IFF/SSR is not affected.

(*c*) *Triple Inverter Failure*

If all three inverters fail, all AC operated services are lost except the standby artificial horizon and direction indicator, the starboard (instructor's) artificial horizon and the IFF/SSR.

(*d*) *Single Generator Failure*

If one generator fails, the No 2 inverter shuts down unless the No 1 inverter has previously failed.

(*e*) *Double Generator Failure*

If both generators fail, No 1 and No 2 inverters shut down and No 3 inverter starts automatically to supply the essential services. In case the 75 knot pitot switch has failed to close, the DI AH switch should be set to EMERGY to ensure that the static inverter is automatically connected to the standby batteries when the main battery voltage falls.

## FLIGHT INSTRUMENTS

### 8 Integrated Flight Instrument System — General

(*a*) The Integrated Flight Instrument System (IFIS) derives its information from the following sources:

(i) A dynamic reference system.

(ii) An air data system.

(iii) Tacan.

(*b*) The information is presented at the pupil's station on an attitude indicator, a navigation display, a speed display and a height and rate of climb display. The navigation display also drives the compass repeater on the instructor's instrument panel.

(*c*) To cover failure of the dynamic reference system, a standby artificial horizon and direction indicator are provided. A standby ASI and standby altimeter are provided to cover failure of the air data system.

(*d*) The AC power for the system is provided by the No 1 inverter with No 2 as standby; No 3 inverter can take over the MRG load if required (para 7(*a*)).

## 9 Dynamic Reference System

(*a*) The dynamic reference system uses a master reference gyro (MRG) to supply continuous attitude and heading information to the attitude indicator and the navigation display.

(*b*) *Master Reference Gyro (MRG) Mk 1 Type E*

(i) The MRG is a gyroscopically stabilised, servo-operated platform assembly. Two platforms, an inner and an outer, are stabilised to the vertical by an earth gyro, which in turn is monitored for drift; any tendency to precess is corrected by gyro torque motors and servo-motors re-align the platforms. The platforms are therefore slaved to the gyro gimbal rings and any relative movement between the aircraft and the two platforms induces bank and pitch signals which are fed to the attitude indicator.

(ii) An azimuth gyro is mounted on the inner platform to feed heading information to the compass. This gyro is normally monitored by a compass detector unit, but compass monitoring is cut off whenever DG is selected on the compass or when flight accelerations and attitudes would cause compass detection errors.

(iii) The MRG is brought into use by the No 1 inverter which, when started, causes the platforms to servo to their datum position (ie approximately level) during the first 3 seconds and then rapidly erects the gyros during the next 17 seconds. An off flag on the attitude indicator clears when the system is functioning normally. If the flag still shows 35 seconds after switch-on, shut down and have the fault investigated.

(iv) An MRG FAST ERECT spring-loaded button is below the attitude indicator. A second fast erection button is on the starboard shelf. When either button is pressed, erection of the vertical gyro takes place at a rate of 17°/min; the normal erection rate is 3°/min. FAST ERECT should be used if it is necessary to remove false errors in attitude indications which may have occurred through sustained accelerations below the limits catered for by the monitoring cut-out devices. The selection should be made in straight and level un-accelerated flight.

(c) *Attitude Indicator Type F4C (F4D post-mod* 1329)

(i) The attitude indicator, which is operated by signals from the MRG, gives a continuous indication of pitch by a roller blind presentation and of roll by a pointer at the bottom of the blind frame. The blind is half-grey and half-black and the dividing line represents the natural horizon. When the horizon is not visible on the display at high climbing or diving angles a zenith or nadir star is shown, the long tails of which point in the direction of the nearer horizon. Looping manoeuvres which pass the zenith or nadir result in rapid rotation of the blind through 180°. Two concentric circles on the face of the instrument represent 20° and 40° of pitch and, in the vertical plane only, there are additional marks representing 10°, 30° and 50°. Roll markings are 10°, 20°, 30°, 60° and 90° port and starboard.

(ii) A translucent orange disc, bearing two arrows, indicates power failure. It is normally covered by a black disc which lifts up to show the orange disc if power is lacking. One arrow points to the attitude indicator and the other to the navigation display, for which no separate warning device is fitted.

(iii) A slip indicator is fitted above the face of the instrument.

## 10 Navigation Display

The navigation display combines the functions of a gyro magnetic compass indicator, a Tacan range and bearing display and an offset Tacan display. Any one of the three modes can be selected by a COMP/ILS/TAC/DL mode selector; the ILS setting is inoperative.

(a) *Compass Mode (COMP)*

(i) With COMP selected at the mode switch, the display shows only the compass card. A COMP-DG button to the left of the display selects either magnetic compass monitoring or directional gyro. If DG is selected, the window beneath the button shows DG; with COMP selected, it remains blank.

(ii) A compass monitoring annunciator window is on the face of the instrument. With compass selected and synchronised, a dot/cross annunciator slowly oscillates in the window. If DG is selected, the annunciator is held in the de-energised central position. Fast synchronisation is achieved by pressing and turning a SYN knob at the bottom right of the instrument. The correct direction of turn is indicated by the ease with which the knob can be turned. If resistance is felt, it indicates turning in the wrong direction.

(iii) At the bottom left of the instrument, is a HDG knob which, when pressed and turned, moves a heading selection pointer on the instrument.

(*b*) *Tacan (TAC/DL)*

(i) With DL selected on the mode selector and Tacan operating, the display indicates the range and bearing of the selected Tacan beacon. The roller blind display gives a series of concentric arcs, each representing 20 NM distance from the beacon. Distance to the beacon is read off at the centre of the display and is also repeated in a RANGE NM window at the top left of the display. A line bisecting the range arcs indicates the bearing of the beacon when read against the compass card.

(ii) With TAC selected, the display indicates the range and bearing of a selected homing point. The range and bearing of the homing point from the selected Tacan beacon is set on the Tacan offset computer above the navigation display.

## 11 Air Data System

(*a*) *General*

The air data system measures pitot and static pressure signals, converts them into electrical signals by transducers and passes them to an air data computer. The computer transforms the signals into suitable output for the speed, height and rate of climb displays.

(*b*) *Speed Display*

The speed display consists of a white strip moving horizontally across a fixed IAS scale above the strip and a moving mach number scale below the strip. The mach number scale overreads at high speed; pressure error correction is approximately minus 0·06M for an indicated 1·01M reading.

(*c*) *Height and Rate of Climb Display*

The height and rate of climb instruments provide standard presentations. When power supplies to the display are lacking, an orange disc appears to replace the 0 scale mark on the height dial.

## 12 Standby Artificial Horizon and Direction Indicator

(*a*) The standby artificial horizon and direction indicator are provided to meet the case of failure of the dynamic reference system. The two instruments are started by a supply from No 3 inverter prior to engine start; the supply to the instruments is controlled by a control unit type B which incorporates a static inverter. After engine start the AC is supplied by No 1 inverter. Should AC supplies to the control unit fail (ie a triple inverter failure), the static inverter is automatically switched on to provide a continuing supply of AC to the standby instruments. The static inverter is supplied from the main DC busbar; if both generators fail, DC is provided by the main batteries until the voltage falls below that of the standby batteries when an automatic changeover takes place.

(*b*) The Mk 6C artificial horizon incorporates a fast erection button and an orange and black striped off flag. The off flag clears about 10 seconds after the engine master switch is set to on; the instrument is ready for use about 80 seconds later. To restore the gyro axis, press the FAST ERECTION button until fast erection is complete. FAST ERECTION should only be used in straight and level unaccelerated flight.

(*c*) A direction indicator is below the artificial horizon. The turn button of this instrument is also a fast erection push switch. When used for fast erection, a blue light in the indicator comes on. On releasing the button, if the blue light goes out, the instrument is ready for use. If the blue light remains, auto fast erection takes place and

the blue light goes out when the instrument is ready for use.

*(d)* A DI AH — NORMAL/EMERGY switch (wired to NORMAL) is adjacent to the instruments. At the NORMAL position, supply from the standby batteries is cut off by a pitot switch when speed is below 75 knots. This can be overridden by setting the NORMAL / EMERGY switch to EMERGY. If both generators fail, in case the pitot switch has failed to close, the DI AH switch should be set to EMERGY to ensure that the static inverter is automatically connected to the standby batteries when the main battery voltage falls.

### 13 Standby Airspeed Indicator and Altimeter

A standby ASI and Mk 27 altimeter are provided for use in the event of an air data system failure. The two instruments are on the standby flight instruments panel adjacent to the IFIS display together with the standby artificial horizon and direction indicator.

## RADIO AND RADAR

### ◀14 V/UHF

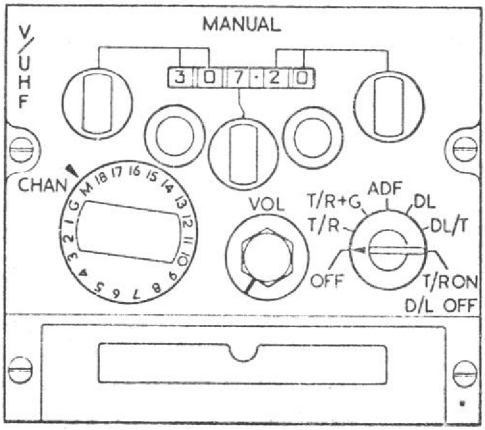
*(a)* Pre-SEM 025/STC, ARC 52 UHF is fitted; refer to Part 1, Chapter 9 for information on the equipment.

*(b)* Post-SEM 025/STC, the ARC 52 UHF is replaced by PTR 175 V/UHF. The standby UHF and the RT/MIX/BEAC switch are unchanged.

*(c)* The PTR 175 equipment provides RT communications on 370 VHF channels in the frequency range 117·5 to 135·95 MHz and 3500 UHF channels in the frequency range 225·0 to 399·95 MHz at 50 kHz spacing.

*(d)* In addition to the normal UHF aerials, a VHF aerial is provided on the upper surface of the port wing; switching between the UHF and VHF aerials is automatic according to the frequency selected.

*(e)* The switching arrangements for the power supplies are the same as those provided for the ARC 52 equipment. ▶




**Annexe 1 Fig 1 PTR 175 V/UHF Control Unit**

*(f)* The control unit (Fig 1) replaces the ARC 52 control unit on the centre instrument panel and has the following controls:

(i) A 7-position function switch:

| | |
|---|---|
| OFF | |
| T/R: | Normal transmission and reception |
| T/R+G: | Normal transmission and reception plus superimposed reception of guard frequency |
| ADF<br>DL<br>DL/T<br>T/R ON-<br>D/L OFF | Inoperative |

(ii) A CHAN 20-position rotary switch giving selection of 18 preset channels, manual tuning (M) or guard frequency (G).

(iii) Three frequency selection knobs for use when manual tuning (M) is selected.

(iv) A VOLume control.

The integral lighting of the control unit is controlled by one of the two centre panel dimmer switches.

## 15 Tacan

*(a)* Refer to Part 1, Chapter 9 for general information on Tacan.

*(b)* The range and bearing information is presented on the navigation display of the IFIS and an additional facility, offset Tacan, enables the aircraft to be homed to a position of which the range and bearing from a beacon are known.

*(c)* The Tacan offset computer is above the navigation display. It has two controls, each with an associated veeder counter, to enable a bearing and distance from the beacon to be selected. If no offset is required, the counters must be set to zero.

*(d)* In the Tacan role the navigation display must be set to DL and in the offset Tacan role it must be switched to TAC.

*(e)* To receive Tacan audio identification signals, the RT/MIX/BEAC switch must be set to MIX (V/UHF and Tacan) or BEAC (Tacan only).

*(f)* Tacan presentation on the navigation display is covered in para 10 of this Annexe.

## 16 IFF/SSR

*(a)* Refer to Part 1, Chapter 9 for general information on IFF/SSR.

*(b)* The control unit is below the starboard instrument panel; the IFF FAIL light and the BRIGHT/OFF/DIM control unit lighting switch are adjacent to the control unit.

*(c)* The 115 volt, 400 Hz AC power supplies are provided by a type E182 static inverter which is controlled by the IFF/SSR master switch; there is no standby AC power supply.

## 17 Rocket Launchers (68 mm) and Practice Bombs

*(a)* Post-mod 1366, 68 mm rocket launchers and 25 or 28 lb practice bombs can be carried on the outboard pylons (see Part 2, Chapter 2 for limitations).

*(b)* The following changes are made to the armament panel:

(i) The guarded BOMBS/OFF/RP switch is replaced by a lock toggle switch.

(ii) An RP RIPPLE/SALVO/SNEB switch is provided. The RP RIPPLE position is permanently guarded.

*(c) RP Firing*

When the BOMBS/OFF/RP switch is set to RP and the SALVO/SNEB switch is set to SNEB, RP are fired by pressing the bomb/RP button on either control column. The launchers can be jettisoned.

*(d) Practice Bombs Release*

When the BOMBS/OFF/RP switch is set to BOMBS, the FUZE/DEFUZE switch is set to FUZE and the INBD/OUTBD pylons switch on the port cockpit wall set as required, bombs are released by pressing the bomb/RP button on either control column. The bomb carriers can be jettisoned.

*(e) Pylon Stores Jettisoning*

(i) Pylon stores are jettisoned by use of the INBD and OUTBD STORES JETTISON buttons. The setting of the pylon selector switch has no effect on stores jettison but the bomb fuzing switch must be at DEFUZE.

(ii) Practice bomb carriers and rocket launchers can be jettisoned only by use of the jettison buttons.

(iii) Practice bombs cannot be jettisoned separately from their carriers using the jettison buttons.

*(f) 'Clear Aircraft' Switch Bar*

The CLEAR A/C switch bar operates normally to jettison the stores on all four pylons provided that the bomb fuzing switch is at DEFUZE.

*(g) Master Armament Safety Break*

A MASB press-to-test warning light is on the intercom switch panel above the starboard shelf. If the MASB is connected, the light comes on when pressed.

## MISCELLANEOUS

### 18 Miscellaneous Changes

The following miscellaneous changes are embodied to bring the aircraft to T Mk 8B standard.

*(a) Engine RPM Indicator*

A percentage type RPM indicator is fitted. The corresponding percentage RPM indications are shown in the table below:

| *Engine RPM* | *%* | *Engine RPM* | *%* |
|---|---|---|---|
| 3000 | 36 | 6700 | 80·5 |
| 3700 | 44·5 | 6900 | 83 |
| 4000 | 48 | 7200 | 86·5 |
| 4500 | 54 | 7700 | 92·5 |
| 6500 | 78 | 7950 | 95·5 |
| 6600 | 79 | 8100 | 96·4 |

*(b) Re-Positioned Instruments and Controls*

(i) The landing gear and flaps emergency air pressure gauges are on the cockpit starboard wall.

(ii) The airbrake magnetic indicator is on the port shelf.

(iii) The JPT gauge and RPM indicator are on the centre panel.

(iv) The cockpit altimeter is on the cockpit starboard wall.

(v) The windscreen wiper control is above the IFIS speed display.

*(c) Height Encoding Altimeter*

A Mk 30B height encoding altimeter (without a PECU) is

on the starboard instrument panel. The instrument is similar to the Mk 30A altimeter described in Part 1, Chapter 6. The 115 volt, 400 Hz AC power supplies are from the essential services busbar.

*(d) Lighting*

(i) An IFIS lighting dimmer switch is below the IFIS display. The switch also controls the lighting of the panel below the port instrument panel.

(ii) Post-mod 1380 upper and lower anti-collision lights are fitted. The ANTI-COLL LIGHTS — ON/OFF switch is on the centre panel.

## 19 Airstream Direction Detector

*(a)* An airstream direction detector (ADD) provides a direct reading of angle of attack (AOA) and a visual and audio indication of the optimum approach angle. An ADD MASTER — ON/OFF switch on the cockpit port wall controls the 28 volt DC power supplies to the equipment; an APPROACH AID — ON/OFF switch and volume control adjacent to the master switch control the visual and audio approach aids.

*(b)* The ADD probe, on the port side of the nose, is divided horizontally into upper and lower halves, each half having a row of perforated slots facing into the airstream. The air pressure in each half is passed to opposite sides of a vane in a chamber; the vane is mechanically linked to the probe. At a steady angle of attack, the pressure differential is zero; when the angle of attack is varied, the resulting pressure differential acts on the vane to rotate the probe until the differential is again zero. Rotation of the probe is detected by potentiometers to measure the angle of attack which is supplied to the AOA indicator and the 3-tone generator which provide the visual and audio approach aids. The probe is electrically heated; the heater is controlled by the master switch.

*(c)* The AOA indicator on the left of the port GGS is calibrated in units from 0 to 30. Two movable markers on the scale can be set to the optimum approach angle and stall warning positions; two additional markers can be set to provide a reference for any required manoeuvres. An OFF flag shows when power supplies are lacking; if the

indicating circuit malfunctions, the pointer moves off scale.

*(d)* The approach index consists of a display of three lights, one showing a circle to represent optimum approach angle, the others being two arrows which show the direction of required correction. The brilliance of the lights can be adjusted by an external lever. The significance of the indications are:

| *Indication* | *Approach* | *Correction* |
|---|---|---|
| Upper arrow | Very slow | Lower nose |
| Upper arrow and circle | Slow | Lower nose slightly |
| Circle | Correct | Nil |
| Lower arrow and circle | Fast | Raise nose slightly |
| Lower arrow | Very fast | Raise nose |

*(e)* When switched on at the commencement of an approach, the audio signal is first heard as a high-pitched tone, interrupted at a rate of 10 per second. As speed is reduced and the optimum angle of attack is approached, the rate of interruption gradually decreases to 1 per second and a continuous medium-pitched tone is superimposed. At the optimum angle of attack, only the continuous medium-pitched tone is heard. If the angle of attack is increased beyond the optimum, a low-pitched tone, interrupted at rate of 1 per second, is superimposed on the continuous tone; the rate of interruption increases gradually to 10 per second as the angle of attack increases towards the stalling angle.

Note: The audio warning cannot be heard if the radio is not functioning.

*Intentionally Blank*